



Alternative learning environments by alternative retrofitting processes

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ALTERNATIVE LEARNING ENVIRONMENTS BY ALTERNATIVE RETROFITTING PROCESSES

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ABSTRACT

Purpose: This paper presents the Campus retrofit framework (CARE-FRAME), which is an outcome of research, development and innovation project among Nordic university campuses. The Nordic campus retrofitting case studies (demonstrations) were analyzed during the process from different perspectives. CARE-FRAME integrates the different perspectives to one holistic model.

Background: The transformation of learning environments in university campus is often about retrofitting the parts of campus, which are not functional anymore. They do not provide any value for the users and the new ways of learning and working. Traditionally the retrofitting approach is about adding new technology, features or services to the existing built environment systems. However campus-retrofitting process needs to be much more aligned with organizational goals, visions and strategies.

Approach: The analysis of different campus retrofitting demonstrations as well as literature review and participatory workshops are the foundation of the CARE-FRAME.

Results: CARE-FRAME characterizes perspectives of the activity-based retrofitting as systemic context, co-operative processes and integrative, blended environments.

Practical implications: CARE-FRAME and its three perspectives provide a tool which can be used in updating and developing alternative learning and working environments to campus. It emphasizes that core of the retrofitting is in practices, co-creation and social dimension of places. Core is supported by more tangible elements like economical and technical solutions.

Keywords:

University campus, Retrofitting, Framework, Learning environment

1 INTRODUCTION

Nordic universities have been investigating and analyzing campus retrofitting case-studies, which include a wide spectrum of methods how interaction and co-creation between students, teachers, researchers, real estate and FM staff as well as industry can take place in campus retrofitting processes. The wide user group represents a broad cross section of perspectives and experiences and provides a platform for fruitful discussions of the studied demonstration projects. The transformation of learning environments in university campus is often about retrofitting the parts of campus, which are not functional anymore. They do not provide any value for the users and the new ways of learning and working. Traditionally the retrofitting approach is about adding new technology, features or services to the existing built environment systems. However campus-retrofitting process needs to be much more aligned with organizational goals, visions and strategies (Eriksson et al. 2015). The retrofitting solution as a technical and spatial solutions covers only part of the process. The activity based retrofitting consists of multidisciplinary collaboration where the diverse users have different roles during the retrofitting process. One can claim that the process and the product are equally important for successful retrofitting concept (Nenonen et al. 2016).

This paper presents the Campus retrofit framework (CARE-FRAME), which is an outcome of research, development and innovation project among Nordic university campuses. The Nordic campus retrofitting case studies (demonstrations) were analyzed during the process from different perspectives. CARE-FRAME integrates the different perspectives to one holistic model. In joint conversations and research projects with Nordic partners the new insights for developing Nordic campuses by using small scale demonstrations as pilots were shared. The foundation of this paper includes analysis of different campus retrofitting demonstrations as well as literature review and participatory workshops. The framework is described by using three Finnish campus retrofitting cases as examples. The paper is concluded with the final recommendations.

2 CAMPUS RETROFITTING FRAME

Three perspectives to campus retrofitting cases were identified during the research project. The first perspective is about systemic context of campus retrofitting. It focuses on levels of campus retrofitting. The second perspective is about co-operation in campus retrofitting processes. The third perspective is about environment: campus retrofitting of digital, social and physical learning and working environments were included in analyzed case-studies.

2.1 Systemic context of campus retrofitting: landscape, regime, niche

University campuses can be seen as constantly evolving complex socio-technical systems (Rytönen 2016). According to a multi-layer perspective theory developed by Geels and his peers

(Geels 2002; Geels 2004; Geels and Kemp 2007; Schot and Geels 2007; Nieminen et al. 2011), socio-technical changes are not solely explainable by single causal relationships but rather by a result of a set of constant, complex interactions on three systemic levels: landscape, regime and niche innovations. In a campus management context, landscape refers to the social, political, economic and technological forces that create pressure on current university practices. The regime level describes the current dominant internal practices of universities. The niche innovations level describes the approaches and experiments that are challenging the dominant regime in an attempt to fulfill the needs of the modern university communities despite the regime level boundaries (Eriksson et al. 2014). The core is in regional changes, tactical systems within university community and organization. The strategic processes are based on drivers, motives and values: new ways of researching, collaborating and learning as well as ecological drivers e.g. lowering the environmental impact. The tactical level includes co-design, co-use and continuous testing and improvement. In operational level realizing the campus retrofitting actions is made by different stakeholders. (Eriksson et al. 2014). The campus retrofitting processes are part of this complex system and classification of landscape, regime and niche is the first dimension of the CARE-FRAME.

2.2 Co-operational processes: co-financing, co-creation, co-evaluating

The Nordic case studies were chosen because they represented new and actual on-going, experimental co-creation strategies at the universities. They are called demonstrations. They provided new insights to innovative processes, where the universities deviated from their standard practice, e.g. use of new methods of user participation. Traditionally campus retrofitting can be seen as a technical process, which is linear and different phases follow each other (technology based retrofitting). Based on the Nordic studies the term “activity based campus retrofitting” was taken into use. It is the ongoing process and not limited to the certain phase of the retrofitting as a financial or technical process. Activity based retrofitting includes three aspects: co-financing, co-creation and co-evaluating. (Eriksson et al. 2015).

Commitment and engagement to sharing costs among stakeholders (co-financing) is a foundation of activity based campus retrofitting. For example property owners or facility managers are sharing the goal of providing good university facilities. Simultaneously they need to achieve goals set to sustainable and energy efficient buildings, sufficient usage rate of university facilities and efficient use of spaces. The financial investments need to be designed with users.

It is important to understand users and their needs as well as diverse activities, which set requirements for future learning environments. The users need to be challenged to provide insights about their activities and they can be in the active role also in designing the solutions. This activity based approach and co-creation are the basis of retrofitting solutions.

Evaluation of co-created solutions together can also be done with users and owners. Diverse methods like user surveys, sensors, interval cameras, user feedback and user interface testing provide evidence about effectiveness of the retrofit solutions. The collected data is a relevant material for continuous improvement (Nenonen et al. 2016). The campus retrofitting processes include co-operative activities in terms of co-financing, co-creation and co-evaluation: this is the second dimension of the CARE-FRAME.

2.3 Integrated environments: digital, social, physical environment

Significant changes in higher education the past decades, such as increased information and communication technology (ICT) and new learning theories have resulted in the dilemma whether higher education institutions can facilitate tomorrow's learning and teaching in

today's or even yesterday's school buildings (Beckers, 2016). Harrison and Les Hutton (2014) refer to Temple (2007), who stated that physical manifestation of universities is a thing of the past as learning will increasingly take advantage of ICT becoming independent of specific spaces, and to Drucker (Forbes, 1997), who predicted that university campuses will turn into relics as they won't survive the next thirty years. Even though a large part of university campus designs still mainly support learning in the traditional sense by providing massive auditoriums focused on teacher-centered pedagogies, and assigned individual offices with low utilization rates, there is also an increasing amount of examples across all five continents of how spatial transformation is changing university campus design principles, actions and processes (Den Heijer and Zovlas (2014).

In order to effectively manage the built environment and foresee the demands of the future, the management focus needs to shift from managing quantifiable empty facilities walls, roofs and floors towards facilitating the user communities that act inside the facilities. As the users act increasingly in both virtual and physical environments and have greater decision power over the ways in which they learn and work the best, effective campus management becomes increasingly complex and tailored (Rytönen 2016). The third dimension of CARE-FRAME is about places: the digital, social and physical learning and working environment.

2.4 Campus retrofitting, CARE-frame

CARE-FRAME integrates three perspectives, which were identified during the research project. The first context perspective includes the levels of campus retrofitting from landscape level to niche level – having the regime level in between. The second co-operative process perspective includes the co-financing, co-creation and co-evaluating processes. The third learning and working environment perspective includes digital, social and physical places. Integration of three dimensions creates the Campus Retrofitting, CARE-FRAME, which characterizes perspectives of the activity-based retrofitting as systemic context, co-operative processes and integrative, blended environments. The criteria to set the perspectives in a certain manner are based on the identified activity based retrofitting approach. The intention is to visualize the core of campus retrofitting, which is based on understanding the regime practices, potential for co-creation and importance of the way how places are understood from social aspect. This provides a core of activities, which then can be supported by surrounding aspects including e.g. landscape level drivers and niche level trials, co-operative processes of finance and evaluation and digital and physical places. The CARE-FRAME is illustrated in Figure 1.

Figure 1: Campus Retrofitting frame



The core of the CARE-FRAME is about the behavior and use of space, which can be co-created within the university community. This perspective is lacking from the technically orientated retrofitting. Integration of different perspectives provides a model, which can be used for more holistic approach to motives, processes and outcome of retrofitting.

These three perspectives frame the retrofitting in the holistic manner including the perspectives of users, property owners and the way how they can combine their resources to develop updated and alternative learning and working environments to campus. The following section provides examples of the use of CARE-FRAME as a practical analysis tool of campus retrofitting.

3 CAMPUS RETROFITTING FRAME IN USE

The cases described in this section are all conducted by University Properties of Finland. They are not large campus development projects but demonstrations within different regimes, departments in three universities in Finland. The departments where the demonstrations took place are Teacher Training School in University of Oulu, department of Music in University of Jyväskylä and School of Information Sciences in University of Tampere. All of them had co-creation processes as a part of campus retrofitting demonstration. The focus in all three demonstrations was in new use of the existing place, the social practices and needs for the physical and digital environment.

The reason to focus only on Finnish cases is due to the fact that the selection of campus retrofitting cases was the most versatile in Finland. While Nordic cases are described and analyzed in the former publications (Eriksson et al. 2014; Eriksson et al. 2015; Nenonen et al. 2016), this paper has a national approach. University Properties of Finland has developed their campus with joint demonstrations that has been used to test and develop scalable solutions. The experimental and explorative approach of the demonstrations enables rapid and impressive changes that develop along with user needs. The decision to begin a larger retrofitting project is a significant physical, digital and social investment and can be a difficult decision to make. To help move this step forward, the changes can be tested beforehand in campus retrofitting demonstrations.

Demonstrations are about identifying the change in the requirements of the space during its entire life span in campus regime. During the process, users and experts co-create, build and test the new space and the concepts of operating it concepts by adapting to the social environment in physical or digital platform. The implementation of the change is followed; co-evaluated and problematic items are developed further as soon as they are detected. Demonstrations are projects in which prototypes of future facilities and culture are created. New ideas and experiments require user participation, making observations and learning from the process. Methods used in co-creation, as well as usage and circumstance measurements, have been utilized to help the development. Performing demonstrations and a culture of experimentation offer opportunities to utilize a renovation budget in a new way: instead of updating the facilities to their original form, as is traditionally done, the facilities are renovated to correspond to modern and future functional needs. For this, the strategic, tactical and operational needs of the activities have been identified and agreed in co-operation with the users.

4 CASE DESCRIPTIONS

4.1 Case Ubiko

The core of case Ubiko was to enhance social place of various learning needs and teamwork between teachers. The driver was a regime level principle of Oulu University, Finland in Teacher Training School to guarantee students' versatile human growth and learning. The co-

creation of a new kind of teaching unit with teachers, pupils and an architect was made in a dialogue. Because Ubiko's design process was led by the users, it was different from normal processes. Deviating from normal practice, the architect did not take part in the design from the first steps of the project; they only joined the team after the teachers had formed the key goals of the change. In addition, the budget was formed during the project. The role of the architect was to draw up the designs based on the goal, through discussions with the core group.

The project created spaces for active learning between classrooms and corridors that formed a rich learning environment together with the classrooms. New space solutions help teachers provide rhythm to and organize their lessons. For example, the lesson can begin in the classroom of their own, where instructions are given, and then the students can spread out to work in small groups in the lobby. In addition with that the technology (e.g. use of iPad's) was an essential part of designing the activities and physical space. In the case of team teaching, sliding doors that divide the classrooms from the lobby enable the formation of larger space entities. Teachers have their own working space in the classrooms where they can prepare for the next lessons while the students work independently. Landscape drivers included the implication of new method of active learning that involves the student to play a key role in making sure the learning objectives in the curriculum are reached. This was not possible in the old facilities.

Usability of the physical place is supported through acoustics, furniture and lighting solutions. Several groups can work in the lobby simultaneously, thanks to wall-to-wall carpeting and ceiling sound insulators that dampen noise from conversations, people moving and furniture being shifted. At the same time, the carpet offers a soft base to sit on and its color zones can be used to limit the space in teaching situations. Lighting can be adjusted to support the activities: a cold tone refreshes while a warm tone is calming.

The development work of the project that was started in the autumn of 2011 was implemented in co-operation with the teachers working in the cell, teaching researchers and design experts. The process was underlined by the subsidy granted by the Finnish National Board of Education to develop the space as a pedagogical cell solution that inspires learning. The co-investing included the input from the property owner in addition to the grant.

After the space was adopted, Ubiko's impact and development needs have been monitored by comparing it to traditional teaching cells. Use experiences gathered from students and teachers reveal that the key goals set for Ubiko have been achieved. During the first year, the use of the spaces was clearly more multivariate and collaborative at Ubiko than in the traditional teaching cells used in the comparison. Acoustic solutions had a notable impact on the usability of the facilities and well-being of the users.

4.2 Case Musica

A core of the campus retrofitting process aimed to increase the use of unused space in regime level. The overhaul aimed to create a place where informal learning takes place as a consequence of multidisciplinary, experience-rich and international interaction. Strengthening the role of music with space solutions that enabled playing music both acoustically and electronically was crucial. It was also important to enable the listening of the music of the club also outside the building. The digital environment in the music production and performance required also technical retrofitting. Students' spontaneous culture activities were also added to the space use needs.

The co-creation was conducted by using Charette-method. A Charrette is a multi-day negotiation and planning process that harnesses different kinds of experts. A Charrette gives all affected parties the possibility to state their opinions about the plan and also to change the new plan. Careful selection of stakeholders and development at the site are important to a successful Charrette. The process varies from a three to a seven day event depending, for

example, on the size of the project and the design process. In Musica the co-creation process lasted five days. Parties included students, university staff, researchers, professors, an architect, a representative of the National Board of Antiquities, the developer, upper secondary school students and other interested parties.

Musica is a building in the department of Music in University of Jyväskylä, Finland and lobby of this building was selected as a change target because there was a desire to turn empty facilities in the building that used to house a restaurant into a facility that supported learning, teaching and research. A new kind of space concept that served the study of music, performance, event use and spending time was created during the five-day Charrette workshop. Plans were illustrated with three-dimensional floor plan sketches made of play-dough. Then plans were illustrated using a scale model made by the participants, based on which the architect drew the proposal regarding the space solution. In the last joint section of the Charrette, the scale model and floor plans were introduced and the feedback on them was processed and applied to the designs.

User participation in the development of Musica was crucial, because the space needs of the students were revealed to be completely different to what the designers had envisioned. Students wanted a free performance arena with acoustic solutions that would allow the performance of both acoustic and electronic music in the premises. The performance methods require different solutions, and the use of a fog machine had to be made possible by changing fire alarms from smoke detectors into temperature detectors. Because the ground floor did not have any toilets, the stairway joining the entire building would have had to be kept open day and night, but this was not possible due to security reasons. As a consequence of realizing this problem, moving around was limited to the ground floor by turning a cleaning cupboard in the lobby into a toilet.

Without the expertise of the users during the design phase, the existing facilities could not have been used in their current form. Joint design also had an impact on the costs of the project. Traditional construction planning would have been more expensive than the measures taken as a consequence of precise mapping of needs to provide value for the users. This was an important saving to the property owner. The change was co-funded, also university joined to the costs.

During the first year, various events, seminars, workshops and parties have been arranged in the facilities. Catering during the events is possible, with a bar kitchen created in the old kitchen. An electronic environment was created to serve meeting and studying requirements, as well as the electronic performance of music. The idea has been to create different uses for the spaces as a consequence of users' creative solutions and needs, in which case the users make the space personal. The end result enables the networking of music professionals, experts and students and also opens the campus to other city residents. A new kind of club concept and the excellent acoustics in the space attract performers from all over Finland. The space plays a notable role as an implementer of the joint music campus vision of the University of Jyväskylä and University of Applied Sciences, which indicates that the process had also landscape effects.

4.3 Case Oasis

There was a desire to have a modern version of a library that was aligned to its subject, information science, where learning takes place by combining science and playing, via the industry literature and users' interaction, games and media in University of Tampere, Finland. The design process was started two years before Oasis was completed by using a survey to map the students' experiences of the student facilities on the campus. Responses from nearly 500 students proved that there was extensive dissatisfaction regarding the accessibility and characteristics of the workspaces on the campus. A group of students from various fields who responded to the survey enrolled in the next phase of the process.

The participants were invited to the future facilities of Oasis for group interviews in which the key themes related to the creation of the new concept were reviewed. The process continued by arranging several joint workshops for students and researchers in which the participants were free to come up with ideas for new concepts to achieve a better operating environment. The concepts have been introduced in the 'Making of Oasis' book, which was published on the Oasis website. The architect drew up designs for the space based on the wishes and concepts created by the participants. A user representative took part in the construction process to ensure that the implementation of the new kind of space and exceptional space solutions and needs were successful. After the change work, the information science students tested the facilities for a month to enable the final development work to be carried out before the official opening.

A strong influence behind the change has been the 'Oasis philosophy' that was developed during the process. This emphasizes the opportunistic use of the space and communal and experiential goals. In practice, opportunistic use refers to the user friendliness of the space and the use possibilities it offers, especially in the field of technology. The community spirit and experimental nature of the space are created as students and staffs meets outside lectures and create a close community that supports learning and commitment when you feel you belong to it.

The space had to enable the seamless mixing of studying and free time. To realise the goals, both the students and staff took part in the creation process of the space. The funding was shared between university property owner and the university. Since its completion, concept Oasis has been in active use, especially for spontaneous studying, event activities, and just spending time. The project was funded together.

Now OASIS is a social learning and research space at the University of Tampere. The key characteristic of the space is its playful, elevated auditorium like floor plan with bookshelves and four group stations with TV screens on the sides of the room. In addition to the big room, there is a small tube-like space underneath the highest step and a more conventional meeting room with open windows to the corridor and peek-windows to the OASIS. OASIS is a research-driven space: the design of the space was informed by design research conducted at the Tampere Research Center for Information and Media (TRIM), and ongoing follow up study of OASIS works as a basis for the future development. The space is open to everyone and it is not restricted to users during the opening hours of the building at all. There was a desire to ensure that the purpose of use of the space was not defined in advance, but that it was allowed to form itself through general use. Only the weekly events, such as games nights and hours reserved for quiet working, set temporary limits to the use.

Activities and furniture are revamped each semester: The fourth season that began in the autumn of 2015 introduced a 'meeting tub' filled with plastic balls, and a knitting corner. Some of the activities in the space take place via social media, which is utilized not only for communications but also for interaction between users. Operations at Oasis are the responsibility of Key Master persons who work on a volunteer basis. These people help users, arrange events and develop the facilities. Changing, playful elements are tried out at Oasis: pillows that make angry and happy sounds created an atmosphere and attracted new visitors. Relaxed meetings and working is possible in the 'meeting tub'. The walls at the floor level have been equipped with sliding glass doors to emphasize the experience of openness. Wall-to-wall carpeting improves acoustics and comfort through its vibrant color range, while it offers a soft seat in the platforms in addition to beanbag chairs.

4.4 Summary of the cases

The campus retrofitting cases presented are summarized in the following Table 1 by using CARE-FRAME.

Perspective		Case Ubiko	Case Musica	Case Oasis
CARE CORE	Regime	Teacher Training School's aim to guarantee students' versatile human growth and learning	Department of Music aim to increase informal learning by enhancing multidisciplinary, experience-rich and international interaction	School of Information sciences aim to enhance learning by combining science and playing, via the industry literature and users' interaction, games and media
	Social	New ways of teaching in more collaborative way: various learning needs and teamwork between teachers	Informal learning by providing a platform for pending time, performing, learning and organizing events	Communal and experiential processes for learning and encouraging the opportunistic use of the space
	Co-creation	Co-creation with teachers, an architect joined after the teachers had defined the goals of the change which is achieved by retrofitting process	Co-creations with diverse users by using Charette-method	Ethnographic study and co-creation with students and staff – two years orientation and background investigation for design brief and co-design with architect
Landscape		New method of active learning that involves the student to play a key role in making sure the learning objectives in the curriculum are reached	New ways of performing music in collaboration with local stakeholders, e.g. university of applied science and providing a possibility for the town to use the place	New ways of providing open learning environment which is easy to access in the university campus
Digital		Digital tools were part of the learning environment use and design	Using the digital technology both in music production and performance	Interfaces and accessibility with diverse devices, social media as one platform
Co-financing		National Grant for the University and investment of property owner	Property owner and University	Property owner and University
Physical		The old, unsuitable classroom was replaced with the new learning environment which is not according to the traditional space typology of school	The empty, neutral lobby with closed cantina changed to the active culture hub and a meeting place in the campus	The traditional meeting room area changed to a social learning and research space, which is open to everyone
Niche		From six classrooms to one multifunctional area for different learning activities with good indoor environment	From empty lobby to town's best stage and club kind of environment – music hub	From neutral meeting room to multifunctional learning Living lab
Co-evaluating		Feedback and learning outcomes, monitoring the use of space	User surveys, sensors	User feedback, observations – ongoing development based on conducted playful experiments research

Table 1: Analysis of cases by Campus Retrofitting frame

CARE-FRAME indicates that the core is always about the change in user processes (social perspective in regime (school, department) level. The understanding of changing needs happened in co-creation process and architects joint to the co-creation activities. The agreements of co-financing provided to develop new physical and digital platform. In all cases the university took the financing responsibility of digital environment and the refurbishment costs were shared. The cases provide niche solutions like multifunctional classroom, music hub and living lab and they had also landscape effect: in the first case it was in curriculum level, in the second case in town level and in the third case in campus level. The co-evaluation in the cases took place by users and by property owner. The evaluation agenda was set in the early phase of the process because all parties were interested in the effectiveness of retrofitting changes. This provides data for further development.

The CARE-FRAME provides a holistic approach to the campus retrofitting cases. It makes it easier to identify the intangible but important perspective of user processes in the retrofitting process. The process is based on user activities not only to technical changes in the physical environments. If the starting point had been in physical environment more the activities in the space would not have been leading the solutions, but most likely the technology-based solutions would have been there. CARE-core captures the non-measurable and not explicit perspectives which then can be supported by more quantified perspectives of retrofitting, e.g. money, square meters, sensory data etc. The larger campus retrofitting projects can be analyzed by using CARE-FRAME in the similar way as it is now tested in the smaller cases.

5 CONCLUSIONS AND DISCUSSION

Joint development, joint funding and joint assessments are perspectives of campus retrofitting, which includes the update of activities and facilities. Conducted experimental demonstrations are scalable. The concepts, processes, services and technical solutions in future learning and working environments need to be developed together with users based on their visions and experiences how the processes will change.

Today's universities largely embrace a model of higher education developed over 100 years ago. Campus development is no longer about the construction of lecture halls, reading rooms and offices. Campus development is an important strategic tool to attract and keep excellent researchers, teachers and students. Campus retrofitting is part of this development.

The demand for space that supports the fundamental characteristics of experimentation, interdisciplinary work, education programs and collaboration with private and public organizations is urgent. Campus retrofitting is not only updating the existing premises, it is a co-operative process to develop together solutions, which are sustainable also in the future.

CARE-FRAME characterizes perspectives of the activity-based retrofitting as systemic context, co-operative processes and integrative, blended environments. It needs further development and validation. It has been developed based on experiences of retrofitting in Nordic campuses. It is one tool to involve different stakeholders around the same table in the development of built environment as a platform for future activities.

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